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1 Lead-in

1.1 Overview

Congratulations on your purchase of the Ixxat CAN-GW100/RS232, a high-quality electronic component developed and manufactured according to the latest technological standards.

This manual is intended to familiarize you with your CAN-GW100/RS232. Please read this manual before initial startup.

The CAN-GW100/RS232 enables devices with only one serial port a simple, configurable access to CAN and CANopen networks. CAN-GW100/RS232 provides two operation modes for this purpose.

In the CAN operation mode (CANmode), received CAN data are transmitted transparently to the RS232 interface. Data received via RS232 are mapped into CAN telegrams and transmitted. One configurable identifier each is available for transmission and reception.

In the CANopen operation mode (COPmode), the CAN-GW100/RS232 operates as a CANopen node, where the serial data are stored as a byte stream object in the manufacturer-specific object dictionary range.

The supported CANopen features are:

- 1 server SDO expedited, non-expedited, no CRC check
- 1 TX PDO static mapping
- 1 RX PDO static mapping
- Emergency message
- Heartbeat producer
- NMT slave

The communication interfaces and operation modes are configured by means of a configuration file, which is saved on the device via a loading program.
2 Connections

2.1 Connector Allocation
The pin allocation for the Industrial DIN rail version is shown in Fig. 2-1.

![Connector arrangement diagram]

Fig. 2-1: Connector arrangement

2.1.1 Power Supply (X1)
The device is supplied with DC voltage of 9 V - 36 V. The pin allocation is shown in Table 2-1. The CAN-GW100/RS232 is protected against polarity reversal, under-voltage and over-voltage.

In the event of polarity reversal or under-voltage, it is switched off, with over-voltage an internal fuse is triggered.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PE</td>
</tr>
<tr>
<td>2</td>
<td>PWR (+)</td>
</tr>
<tr>
<td>3</td>
<td>GND (-)</td>
</tr>
</tbody>
</table>

Table 2-1: Terminal allocation Power
2.1.2 Serial Interface RS232 (X2)

The signals of the serial port are connected to the 9-pin Sub-D connector X2 (see Table 2-2).

<table>
<thead>
<tr>
<th>Pin no. X2</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
</tr>
<tr>
<td>2</td>
<td>RX</td>
</tr>
<tr>
<td>3</td>
<td>TX</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
</tr>
<tr>
<td>9</td>
<td>RI</td>
</tr>
</tbody>
</table>

Table 2-2: Pin allocation RS232

2.1.3 CAN (X3)

CAN is available on X3 with a bus interface according to ISO 11898-2 (see Table 2-3).

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>CAN High</td>
</tr>
<tr>
<td>5</td>
<td>CAN Low</td>
</tr>
<tr>
<td>6</td>
<td>GND</td>
</tr>
</tbody>
</table>

Table 2-3: Terminal allocation CAN1

2.2 Ground Connections

In the galvanically isolated version, the GND of CAN (X3) is isolated from the rest of the circuit, the GND of the serial port (X2) is connected to the GND of the power supply (X1).

In the version without galvanic isolation, all GND connections (X1, X2, X3) are connected with each other.

The shield connection of the serial port (X2) and the PE connection (X1 – terminal 1) are connected with each other both in the version with and in the version without galvanic isolation.
3 Description of Functions

3.1 Introduction
The CAN-GW100/RS232 offers the two operation modes CANmode (RS232-CAN Gateway) and COPmode (RS232-CANopen Gateway).

In CANmode, the device transmits the data that arrives on the serial port to the CAN bus under a configurable identifier. In the same way, data that are received via CAN by means of another configurable identifier are passed on to the serial port.

The identifiers, CAN parameters and the parameters of the serial port used can be freely configured.

In COPmode, the databytes that arrive on the serial port are transmitted on the CAN bus via TxPDO. Conversely, the data received via a certain RxPDO are passed on to the serial port. On the CANopen side, the “Byte Stream Protocol” is used as the communication protocol.

The CAN-GW100/RS232 can be configured via the serial port with the aid of a download tool.

3.2 RS232-CAN Gateway
Table 3-1 shows the functions and the associated key words, relevant for the CANmode.

<table>
<thead>
<tr>
<th>Function</th>
<th>Possible settings</th>
<th>Key words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation mode</td>
<td>CANmode</td>
<td>OperationMode (under [General])</td>
</tr>
<tr>
<td>Timeout</td>
<td>0 - 6.5 s</td>
<td>Timeout (under [General])</td>
</tr>
<tr>
<td>Baudrate for CAN bus</td>
<td>1. Setting of a CiA baudrate 2. Setting the bus timing register BTR0 / BTR1</td>
<td>CANbaudrate (under [CANBus])</td>
</tr>
<tr>
<td>Frame Format for CAN bus</td>
<td>1. Standard Frame Format (11bit identifier) 2. Extended Frame Format (29 bit identifier)</td>
<td>FrameFormat (under [CANBus])</td>
</tr>
</tbody>
</table>
Description of Functions

<table>
<thead>
<tr>
<th>CAN identifier for transmission of the data to the CAN bus</th>
<th>All CAN identifiers are possible</th>
<th>SendID (under [CANmode])</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN identifier for receiving data from CAN bus</td>
<td>All CAN identifiers are possible</td>
<td>ReceiveID (under [CANmode])</td>
</tr>
</tbody>
</table>

**Table 3-1**

### 3.3 RS232-CANopen Gateway

Table 3-2 shows the functions and the associated key words, relevant for the COPmode.

<table>
<thead>
<tr>
<th>Function</th>
<th>Possible settings</th>
<th>Key words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation mode</td>
<td>COPmode</td>
<td>OperationMode (under [General])</td>
</tr>
<tr>
<td>Timeout</td>
<td>0 - 6,5 s</td>
<td>Timeout (under [General])</td>
</tr>
<tr>
<td>RS232 parameter</td>
<td>1. Baudrate</td>
<td>RS232baudrate</td>
</tr>
<tr>
<td></td>
<td>2. Number of databits</td>
<td>Databits</td>
</tr>
<tr>
<td></td>
<td>3. Parity</td>
<td>Parity</td>
</tr>
<tr>
<td></td>
<td>4. Flow control</td>
<td>Handshake (all under [RS232])</td>
</tr>
<tr>
<td>CANopen baudrate</td>
<td>CiA baudrates are possible</td>
<td>CANopenBaudrate (under [COPmode])</td>
</tr>
<tr>
<td>CANopen node number</td>
<td>1-127</td>
<td>CANopnNode (under [COPmode])</td>
</tr>
<tr>
<td>Heart Beat Time</td>
<td>0- 32 s</td>
<td>HBTime (under [COPmode])</td>
</tr>
<tr>
<td>Receive PDO</td>
<td>PDO ID – all free CANopen Ids</td>
<td>RxPDO</td>
</tr>
<tr>
<td></td>
<td>PDO Type – 0..240, 252..255</td>
<td>RxPDOtype (under [COPmode])</td>
</tr>
<tr>
<td>Transmit PDO</td>
<td>PDO ID – all free CANopen Ids</td>
<td>TxPDO</td>
</tr>
<tr>
<td></td>
<td>PDO Type – 0..240, 252..255</td>
<td>TxPDOtype (under [COPmode])</td>
</tr>
<tr>
<td>Flow control on CAN</td>
<td>On / off</td>
<td>ByteStreamExtension (under [COPmode])</td>
</tr>
</tbody>
</table>

**Table 3-2**

In COPmode, the CAN-GW100/RS232 is an CANopen slave. Nearly all parameters may be configured over the object dictionary using SDO. Table 3-3 shows the Object Dictionary of the CAN-GW100/RS232 in the RS232-CANopen gateway mode.
## Description of Functions

<table>
<thead>
<tr>
<th>Idx</th>
<th>Sidx</th>
<th>Name (Reference)</th>
<th>Attrib</th>
<th>Mapable</th>
<th>Obj Type</th>
<th>DataType</th>
<th>Default Value, Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>00</td>
<td>device type</td>
<td>ro</td>
<td>n</td>
<td>VAR</td>
<td>Unsigned32</td>
<td>0x0000000000</td>
</tr>
<tr>
<td>1001</td>
<td>00</td>
<td>error register</td>
<td>ro</td>
<td>y</td>
<td>VAR</td>
<td>Unsigned8</td>
<td>0x00</td>
</tr>
<tr>
<td>1003</td>
<td></td>
<td>pre-defined error field</td>
<td></td>
<td></td>
<td>ARRAY</td>
<td>Unsigned32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>00</td>
<td>number of entries</td>
<td>rw</td>
<td>n</td>
<td>VAR</td>
<td>Unsigned8</td>
<td>0x00</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>standard error field</td>
<td>ro</td>
<td>n</td>
<td>Unsigned32</td>
<td>0x00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>standard error field</td>
<td>ro</td>
<td>n</td>
<td>Unsigned32</td>
<td>0x00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>standard error field</td>
<td>ro</td>
<td>n</td>
<td>Unsigned32</td>
<td>0x00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>standard error field</td>
<td>ro</td>
<td>n</td>
<td>Unsigned32</td>
<td>0x00</td>
<td></td>
</tr>
<tr>
<td>1005</td>
<td>00</td>
<td>COB-ID SYNC message</td>
<td>rw</td>
<td>n</td>
<td>VAR</td>
<td>Unsigned32</td>
<td>0x000000080</td>
</tr>
<tr>
<td>1008</td>
<td>00</td>
<td>manufacturer device name</td>
<td>ro</td>
<td>n</td>
<td>VAR</td>
<td>Vis-String</td>
<td>“IXXAT COPlink”</td>
</tr>
<tr>
<td>1009</td>
<td>00</td>
<td>manufacturer hardware version</td>
<td>ro</td>
<td>n</td>
<td>VAR</td>
<td>Vis-String</td>
<td>“01.01”</td>
</tr>
<tr>
<td>100A</td>
<td>00</td>
<td>manufacturer software version</td>
<td>ro</td>
<td>n</td>
<td>VAR</td>
<td>Vis-String</td>
<td>“1.1.2.0”</td>
</tr>
<tr>
<td>100C</td>
<td>00</td>
<td>Guard time</td>
<td>rw</td>
<td>n</td>
<td>VAR</td>
<td>Unsigned16</td>
<td>0</td>
</tr>
<tr>
<td>100D</td>
<td>00</td>
<td>Life time factor</td>
<td>rw</td>
<td>n</td>
<td>VAR</td>
<td>Unsigned8</td>
<td>0</td>
</tr>
<tr>
<td>1010</td>
<td></td>
<td>store parameters</td>
<td></td>
<td></td>
<td>ARRAY</td>
<td>Unsigned32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>00</td>
<td>largest Sidx supported</td>
<td>ro</td>
<td>n</td>
<td>ARRAY</td>
<td>Unsigned8</td>
<td>0x04</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>save all parameters</td>
<td>rw</td>
<td>n</td>
<td>VAR</td>
<td>Unsigned32</td>
<td></td>
</tr>
<tr>
<td>1011</td>
<td></td>
<td>restore parameters</td>
<td></td>
<td></td>
<td>ARRAY</td>
<td>Unsigned32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>00</td>
<td>largest Sidx supported</td>
<td>ro</td>
<td>n</td>
<td>Unsigned32</td>
<td>0x04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>restore all default parameters</td>
<td>rw</td>
<td>n</td>
<td>Unsigned8 0x00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1014</td>
<td>00</td>
<td>COB-ID Emergency</td>
<td>rw</td>
<td>n</td>
<td>VAR</td>
<td>Unsigned32</td>
<td>0x80+Node-ID</td>
</tr>
<tr>
<td>1016</td>
<td></td>
<td>Consumer Heartbeat Time</td>
<td></td>
<td></td>
<td>ARRAY</td>
<td>Unsigned32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>00</td>
<td>Number entries</td>
<td>ro</td>
<td>n</td>
<td>Unsigned8 0x05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>Consumer Heartbeat Time</td>
<td>rw</td>
<td>n</td>
<td>Unsigned32 0x00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>Consumer Heartbeat Time</td>
<td>rw</td>
<td>n</td>
<td>VAR</td>
<td>Unsigned32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>Consumer Heartbeat Time</td>
<td>rw</td>
<td>n</td>
<td>VAR</td>
<td>Unsigned32</td>
<td></td>
</tr>
<tr>
<td>1017</td>
<td>00</td>
<td>producer heartbeat time</td>
<td>rw</td>
<td>n</td>
<td>VAR</td>
<td>Unsigned16</td>
<td>0x00</td>
</tr>
<tr>
<td>1018</td>
<td></td>
<td>identity object</td>
<td></td>
<td></td>
<td>RECORD</td>
<td>Identity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>00</td>
<td>number of entries</td>
<td>ro</td>
<td>n</td>
<td>Unsigned8 0x04</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>Vendor-ID</td>
<td>ro</td>
<td>n</td>
<td>Unsigned32 0x04</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>Product code</td>
<td>ro</td>
<td>n</td>
<td>Unsigned32 341</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>Revision number</td>
<td>ro</td>
<td>n</td>
<td>Unsigned32 0x00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>Serial number</td>
<td>ro</td>
<td>n</td>
<td>Unsigned32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Description of Functions

<table>
<thead>
<tr>
<th>Idx</th>
<th>Sidx</th>
<th>Name (Reference)</th>
<th>Attrib</th>
<th>Mapable</th>
<th>Obj Type</th>
<th>DataType</th>
<th>Default</th>
<th>Value, Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td></td>
<td>server SDO 1</td>
<td>ro</td>
<td>n</td>
<td>RECORD</td>
<td>SDO Param</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>00</td>
<td>number of entries</td>
<td>ro</td>
<td>n</td>
<td>RECORD</td>
<td>SDO Param</td>
<td>0x02</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>01</td>
<td>COB-ID client-&gt;server</td>
<td>rw</td>
<td>n</td>
<td>RECORD</td>
<td>PDO Param</td>
<td>0x02</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>02</td>
<td>COB-ID server-&gt;client</td>
<td>rw</td>
<td>n</td>
<td>PDO Param</td>
<td>PDO Mapping</td>
<td>0x02</td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td></td>
<td>receive PDO 1 comm. parameter</td>
<td>RECORD</td>
<td>PDO Param</td>
<td>PDO Param</td>
<td>PDO Param</td>
<td>0x02</td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td>00</td>
<td>number of entries</td>
<td>ro</td>
<td>n</td>
<td>RECORD</td>
<td>PDO Param</td>
<td>0x02</td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td>01</td>
<td>COB-ID used by PDO</td>
<td>rw</td>
<td>n</td>
<td>PDO Param</td>
<td>PDO Mapping</td>
<td>0x02</td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td>02</td>
<td>transmission type</td>
<td>rw</td>
<td>n</td>
<td>PDO Param</td>
<td>PDO Mapping</td>
<td>0x02</td>
<td></td>
</tr>
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<td>RECORD</td>
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---

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<table>
<thead>
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<th>idx</th>
<th>sidx</th>
<th>name (reference)</th>
<th>attrib</th>
<th>mapable</th>
<th>obj type</th>
<th>data type</th>
<th>default value, range</th>
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<td>Low Water Mark</td>
<td>rw</td>
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2003  RS232 parameters RECORD

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<th>obj type</th>
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<th>default value, range</th>
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<td>unsigned8</td>
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<td></td>
<td></td>
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<td>2 – hardware</td>
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2100 00  Byte Stream RxData RECORD

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<th>name (reference)</th>
<th>attrib</th>
<th>mapable</th>
<th>obj type</th>
<th>data type</th>
<th>default value, range</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td></td>
<td>number of elements</td>
<td>ro</td>
<td>n</td>
<td>unsigned8</td>
<td>unsigned8</td>
<td>0x01</td>
</tr>
<tr>
<td>01</td>
<td></td>
<td>1st BSC receive channel</td>
<td>wo</td>
<td>y</td>
<td>unsigned64</td>
<td>unsigned64</td>
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</tr>
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</table>

Table 3-3
3.4 Data Structure of the Configuration Files

A template of the ASCII configuration file can be generated with the download tool (see section 5). The required configuration can be created easily with the template and a text editor. The data structure is based on the Windows INI format.

Possible settings of the configuration file are listed in the following:

[General]
ProductName = CAN-GW100/RS232 ; !Do not change this!
TemplateVersion = 1.0 ; !Do not change this!
OperationMode = COPmode ; CANmode and COPmode are possible
Timeout = 100 ; 0-65000 (0-6500 ms).

[User]
ConfigAlias = "IXXAT default"

[RS232] ; Parameters of serial communication
RS232baudrate = 9600
Databits = 8 ; 7,8
Parity = no ; no, odd, even
Handshake = no ; no, software, hardware

[CANmode]
CANbaudrate = 100
FrameFormat = std ; std (11 bit ID) or ext (29 bit ID)
ReceiveID = 0x100
SendID = 0x101

[COPmode]
CANopenBaudrate = 4
CANopenNode = 0x1
HBTime = 10000 ; if 0 then Heartbeat Producer is disabled
RxPDO = 0x201
RxPDOtype = 0xFF
TxPDO = 0x181
TxPDOtype = 0xFF
ByteStreamExtension = yes ; IXXAT Byte Stream Protocol extension
3.4.1 General Settings [General]
There are four parameters in the ASCII file under the key word [General]:

3.4.1.1 Product Name (ProductName)
The product name states for which product the configuration file is intended. The name is used for a compatibility check and must not be changed.

3.4.1.2 Version Number (TemplateVersion)
The version number of the ASCII file structure. It is used for a compatibility check and likewise must not be changed.

3.4.1.3 Operation Mode (OperationMode)
Via this parameter the user defines whether the CAN-GW100/RS232 functions as an “RS232 – CAN Gateway” or as an “RS232 – CANopen Gateway”. The possible values are CANmode and COPmode. (e.g. OperationMode = COPmode)

3.4.1.4 Timeout
The data of the serial port are transmitted on the CAN bus in blocks of 8 data-bytes each. If fewer than 8 databytes, but at least 1 databyte, are received via the serial port, and no new databyte is received until expiry of the time set under the Timeout parameter, the data received up to this time are transmitted in a smaller block via the CAN bus. The resolution is 0.1 ms (e.g. Timeout = 100 corresponds to 10 ms)

3.4.2 User Settings [User]

3.4.2.1 Configuration Name (ConfigAlias)
The user can set a character chain of up to 15 characters for the designation of the individual configuration. The identification key is stored in the device and can be read out with the download tool.

3.4.3 RS232 Settings [RS232]

3.4.3.1 Baudrate (RS232baudrate)
The following baudrates can be set for the RS232 interface:
600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
(e.g. RS232baudrate = 9600)

3.4.3.2 Number of Databits (Databits)
This parameter defines whether the data are transmitted with a length of 7 or 8 bits. (e.g. databits = 8)
3.4.3.3 Parity (Parity)
Parity defines whether a parity bit is to be transmitted at the same time. The possibilities are even parity (even), odd parity (odd) or no parity (no) (e.g. Parity = no).

3.4.3.4 Flow Control (Handshake)
The handshake parameter defines the type of flow control of the serial data transmission. Possible settings are no handshake (no), software handshake (software) or hardware handshake (hardware) (e.g. Handshake = no).

3.4.4 CAN-GW100/RS232 Settings [CANmode]

3.4.4.1 Baudrate (CANbaudrate)
There are two possibilities for setting the baudrate:

1. Setting a CiA Baudrate:
   10 kbit/s, 20 kbit/s, 50 kbit/s, 100 kbit/s, 125 kbit/s, 250 kbit/s, 800 kbit/s and 1000 kbit/s can be set (e.g. CANbaudrate=1000).

2. Setting via Bit Timing Register
   The baudrate can be set via the bit timing registers BTR0 and BTR1 of the controller. Baudrates can thus also be selected that are not listed in the table.
   The values for the bit timing registers BTR0 and BTR1 are determined according to the specifications for the Philips CAN controller SJA1000 with 16 MHz clock frequency (see data sheet SJA1000).
   However, prescaler PSC (bits 0..5 of the BTR0) must not be larger than 0x1F, with the exception of baudrate 10 kbit, which can be set via 0x31/0x1C.
   (e.g. CAN baudrate = 0x04/0x14 for 200 kbit/s).

3.4.4.2 Frame Format (FrameFormat)
The frame format states in which format the messages are transmitted on the CAN bus. Standard frames (11 bit identifiers) or extended frames (29 bit identifiers) can be selected.
   (e.g. FrameFormat = std)

3.4.4.3 Send Identifier (SendID)
The data received by the serial port are passed on via the CAN bus. The identifier used for data transmission on CAN is defined with the parameter SendID. (e.g. SendID=0x100)
3.4.4.4 Receive Identifier (ReceiveID)
CAN messages with the identifier given under ReceiveID are received by the CAN-GW100/RS232, the data are passed on to the serial port. (e.g. ReceiveID=0x200)

3.4.5 CAN-GW100/RS232 Settings [COPmode]

3.4.5.1 Baudrate (CANopenBaudrate)
The baudrate is defined via the CiA baudrates table:
- 8 - 10kbit/s;
- 7 - 20kbit/s;
- 6 - 50kbit/s;
- 5 - 100kbit/s;
- 4 - 125kbit/s;
- 3 - 250kbit/s;
- 2 - 500kbit/s;
- 1 - 800kbit/s;
- 0 – 1000kbit/s.
(e.g. CANopenBaudrate = 4)

3.4.5.2 CANopen Node Number (CANopenNode)
This parameter defines the CANopen node number of the device. (e.g. CANopenNode = 0x04 )

3.4.5.3 Heartbeat Time (HBTime)
This parameter is used to define the time interval in ms between the heartbeat messages that are transmitted by the heartbeat producer of the device. With HBTime = 0 the heartbeat is switched off.
(e.g. HBTime = 10000 means 10 seconds)

3.4.5.4 Receive PDO (RxPDO)
Message identifier of the receive PDO. The device defines static mapping of the byte stream objects in the receive PDO. CAN messages with the identifier given under RxPDO are received by the CAN-GW100/RS232 as RxPDO of the byte stream protocol, the data are passed on to the serial port. (e.g. RxPDO = 0x201)

3.4.5.5 Receive PDO Type (RxPDOtype)
The parameter RxPDOtype defines how the data of the received PDO are processed further: event-controlled, cyclically or synchronously. If a synchronous PDO is set (0..240,252), the sync message is interpreted as a timeout event (e.g. RxPDOtype = 0xFF).
3.4.5.6 Transmit-PDO (TxPDO)
Data arriving on the serial port are transmitted by the CAN-GW100/RS232 on the CAN bus with the identifier given under TxPDO as a TxPDO of the byte stream protocol (e.g. TxPDO = 0x181)

3.4.5.7 Transmit-PDO Type (TxPDOtype)
The parameter TxPDOtype defines how the PDO is sent. The serial communication via RS232 is generally asynchronous, i.e. as soon as sufficient data have been received via the serial port, the PDO is sent. If a synchronous PDO type is set (0..240,252), the sync message is interpreted as a timeout event (e.g. TxPDOtype = 0xFF)

3.4.5.8 Byte Stream Flow Control (ByteStreamExtension)
The CAN-GW100/RS232 supports Ixxat-specific byte stream commands, which are used for data flow control via CANopen. This increases the stability of the data transfer (e.g. ByteStreamExtension = yes)

3.5 Default Configuration
The CAN-GW100/RS232 is supplied with the following standard configuration:

; this is a configuration file for IXXAT the CAN-GW100/RS232

[General]
ProductName = CAN-GW100/RS232 ; !Do not change this!
TemplateVersion = 1.0 ; !Do not change this!
OperationMode = CANmode ; CANmode and COPmode are possible
; Timeout defines time CAN-GW100/RS232 waits for new data at the RS232
Timeout = 100 ; 0-65000 (0-6500 ms).

[User]
ConfigAlias = "IXXAT default"

[RS232] ; Parameters of serial communication
RS232baudrate = 9600 ; 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bit/s
Databits = 8 ; 7,8
Parity = no ; no, odd, even
Handshake = no ; no, software, hardware
Description of Functions

[CANmode]
; CAN bus baudrate can be defined via CiA value or alternatively
; per registers BTR0 and BTR1 as BTR0/BTR1 (see table below)
; Baud Rate     CiA value     BTR0/BTR1
;  1 Mb/s        1000       0x00/0x14
;  800 kb/s       800       0x00/0x16
;  500 kb/s       500       0x00/0x1C
;  250 kb/s       250       0x01/0x1C
;  125 kb/s       125       0x03/0x1C
;  100 kb/s       100       0x04/0x1C
;   50 kb/s        50       0x09/0x1C
;   20 kb/s        20       0x18/0x1C
;   10 kb/s        20       0x31/0x1C
CANbaudrate = 100
FrameFormat = std   ; std (11 bit ID) or ext (29 bit ID)
ReceiveID   = 0x100
SendID      = 0x101

[COPmode]
; Table of CiA baudrates
; #  Baudrate, kbps
;  0  1000
;  1  800
;  2  500
;  3  250
;  4  125
;  5  reserved (100)
;  6  50
;  7  20
;  8  10
CANopenBaudrate = 4
CANopenNode  = 0x1
HBTime  = 10000   ; if 0 then heartbeat producer is disabled
RxPDO = 0x201
RxPDOtype = 0xFF
TxPDO = 0x181
TxPDOtype = 0xFF
ByteStreamExtension = yes     ; IXXAT byte stream protocol extension
4 Download Tool

The Windows console program CAN-GW100cfg.exe and alternatively the Windows application CANL2cfgGUI.exe are available for configuration of the CAN-GW100/RS232.

4.1 Configuration with Windows Console Program

The program is operated via call parameters. The following possibilities are available to run the program:

- In Windows you can change to the path of the program CAN-GW100cfg.exe via “Start – Run – Browse”. Select by clicking and add the required parameters.
- You can open a DOS box under “Start – Programs – MS-DOS-Prompt”, change to the directory containing the program CAN-GW100cfg.exe and then run it with the corresponding parameters.
- You can create a batch file or a link.
4.1.1 Creating a Configuration File

The following steps are necessary to create a new configuration:

- Call of the program CAN-GW100cfg.exe with the parameter –g (CAN-GW100cfg -g). This creates the template file can-gw100_rs232_def.cfg. By entering a file name after the parameter –g (e.g. CAN-GW100cfg –g myconfig.cfg), the template file is created with this file name.
- The required configuration can now be created by editing the template file with a text editor.

4.1.2 Download of a Configuration

To save a configuration, the serial port of the switched off CAN-GW100/RS232 and the serial port of the PC must be connected with the cable supplied. Then the configuration program CAN-GW100cfg.exe is called with the parameter –a <Filename> [interface] (e.g. CAN-GW100cfg –a myconfig.cfg). When the message “Waiting for device” appears on the screen, the device can be supplied with power, the device goes into configuration mode (see section 5.2) and the download is performed.

In addition to the configuration settings, the file name of the configuration file is also saved in the CAN-GW100/RS232 (max. 15 characters).
4.1.3 Displaying the Current Configuration

The current configuration can be read out with the parameter \(-v\) (e.g. CAN-GW100cfg \(-v\)). After the message “Waiting for CAN-GW100/RS232” appears on the screen, the device must be switched off briefly and then switched on again to enter the configuration mode. The file name of the configuration file and the current settings are displayed.

If a file name is entered after the parameter \(-v\), the configuration of the device is compared with the parameters of the stated file (e.g. CAN-GW100cfg \(-v\) device.cfg). Differences are displayed with the symbol \(<>\).
4.1.4 Saving the Current Configuration

The current configuration of the device can be saved in a file with the parameter –s (e.g. CAN-GW100cfg –s –myconfig.cfg). If no file name is entered, the program uses the configuration file name stored in the CAN-GW100/RS232. After the message “Waiting for CAN-GW100/RS232” appears on the screen, the device must be switched off briefly and then switched on again to enter the configuration mode.

![Screenshot of the configuration tool](image.png)
5 Configuration Tool

5.1 Configuration with Windows Application

The Windows application CAN-GW100cfgGUI.exe is available as an alternative to the Windows console program. The program allows the user to configure the device by means of a graphic interface.

The Windows application displays the configuration file on four configuration pages. Each page lists parameters of the relevant range.

- **“General”** – configuration name, active operation mode, timeout.
- **“RS232”** – parameters for serial port (baudrate, data flow control etc.).
- **“CANmode”** – parameters for CAN-on-RS232 operation mode (TxID, RxID, baudrate etc.).
- **“COPmode”** – parameters for CANopen-on-RS232 operation mode (TxPDO, RxPDO, node number etc.).

5.1.1 Default Configuration

The original configuration of the CAN-GW100/RS232 can be recovered via the menu “File -> New”. This can then be written in the device or in a file.
5.1.2 Loading and Saving a Configuration

The configuration is loaded from a file via “File -> Open”.

The current configuration can be edited and saved in the same file with “File -> Save”. If the configuration should be saved in a different file, use “File -> Save as...”.
5.1.3 Setting up a Connection
In order to configure the device, the serial port of the switched off CAN-GW100/RS232 and the serial port of the PC must be connected with the cable supplied. Please select “Device -> Connect ...”.

Then you are asked to enter the serial port to which you have connected the device.

After selecting the serial port, the device can be supplied with power. As soon as there is voltage on the CAN-GW100/RS232, the device is detected and checked for compatibility. The hardware version and firmware version are displayed in the status bar.
5.1.4 Reading the Current Configuration

The current configuration of the device can be read out via “Device -> Read configuration”.
5.1.5 Downloading a Configuration
To save a configuration in the device, please select “Device -> Download configuration”.

5.1.6 Disconnecting
The connection between the device and the configuration tool can be interrupted at any time via “Device -> Disconnect”.

5.2 Configuration Cable
In order to enter the configuration mode, a connection cable with Sub-D9 sockets at both ends is required for the serial port. The connection of the two Sub-D9 sockets is listed in table 5-1. The connector allocation corresponds to that of a serial laplink cable. This cable is also suitable for normal operation mode.

<table>
<thead>
<tr>
<th>Sub-D9 socket 1</th>
<th>Pin</th>
<th>Pin</th>
<th>Sub-D9 socket 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCD</td>
<td>1</td>
<td>4</td>
<td>DTR</td>
</tr>
<tr>
<td>RX</td>
<td>2</td>
<td>3</td>
<td>TX</td>
</tr>
<tr>
<td>TX</td>
<td>3</td>
<td>2</td>
<td>RX</td>
</tr>
<tr>
<td>DTR</td>
<td>4</td>
<td>1</td>
<td>DCD</td>
</tr>
<tr>
<td>GND</td>
<td>5</td>
<td>5</td>
<td>GND</td>
</tr>
<tr>
<td>DSR</td>
<td>6</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RTS</td>
<td>7</td>
<td>8</td>
<td>CTS</td>
</tr>
<tr>
<td>CTS</td>
<td>8</td>
<td>7</td>
<td>RTS</td>
</tr>
<tr>
<td>RI</td>
<td>9</td>
<td>9</td>
<td>RI</td>
</tr>
</tbody>
</table>

Table 5-1: Connection list of the configuration cable
6 Displays
The CAN-GW100/RS232 has four two-color LEDs (see Fig. 2-1). The LEDs behave as follows depending on the operation mode of the CAN-GW100/RS232.

6.1 Normal Mode

6.1.1 Power LED
The Power LED is lit when the CAN-GW100/RS232 is connected to the supply voltage and the microcontroller is initialized. With a watchdog reset, the Power LED is lit red.

6.1.2 CAN LED
The CAN LED lit green for each message received or transmitted without errors. When the CAN error warning level is reached, the corresponding LED lit red with each reception and transmission. In the 'CAN BUS OFF' state, no more communication is possible and the LED permanently lit red. If data are lost on the CAN interface, the CAN LED flashes red in stand-by mode, with each message received or transmitted without errors the CAN LED briefly lit green in between.

6.1.3 Status LED
In COPmode, the Status LED lit as defined in the “CANopen Indicator Specification”:

<table>
<thead>
<tr>
<th>LED state</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is lit green</td>
<td>CANopen state is OPERATIONAL</td>
</tr>
<tr>
<td>Flashes green</td>
<td>CANopen state is PREOPERATIONAL</td>
</tr>
<tr>
<td>Flickers green</td>
<td>CANopen state is STOPPED</td>
</tr>
<tr>
<td>Is lit red</td>
<td>CAN controller is in bus off state</td>
</tr>
<tr>
<td>Flashes green-red</td>
<td>Error or warning on CAN controller</td>
</tr>
</tbody>
</table>

The Status LED has no function in the operation mode CANmode.

6.1.4 RS232 LED
The RS232 LED flickers green during serial communication. If data are lost on the RS232 interface, the RS232 LED flashes red in stand-by mode, with serial communication the RS232 LED flickers red.
6.2 Configuration Mode

In the configuration mode, the Status LED and the CAN LED flash green simultaneously. The RS232 LED flickers green during transmission of the configuration data.

6.3 Error State

With incorrect parameter values in the flash, all LEDs except the Power LED flash red. In this case the configuration values must be checked and loaded into the device again.
7 Notes on EMC

7.1 Shield Concept

The highest interference immunity is achieved when the shield of the CAN bus is grounded on the assembly plate and the ground terminal (pin 1 / PE) of the CAN-GW100/RS232 is connected to the next available grounding (see Fig. 7-1). Via parallel connection of a resistor (1 MΩ) and a capacitor, the grounding connection is connected internally to the GND of the CAN and of the supply voltage.

Fig. 7-1: Shield concept CAN-GW/RS232
8 Appendix

8.1 Support

For more information on our products, FAQ lists and installation tips, please refer to the support section of our website (www.ixxat.com), which also contains information on current product versions and available updates.

If you have any further questions after studying the information on our website and the manuals, please contact our support department. The support section on our website contains the relevant forms for your support request. In order to facilitate our support work and enable a fast response, please provide precise information on the individual points and describe your question or problem in detail.

If you would prefer to contact our support department by phone, please also send a support request via our website first, so that our support department has the relevant information available.

8.2 Returning Hardware

If it is necessary to return hardware to us, please download the relevant RMA form from our website and follow the instructions on this form.

In the case of repairs, please also describe the problem or fault in detail on the RMA form. This will enable us to carry out the repair quickly.
8.3 Technical Specifications

- **Power supply:** 9 V – 36 V DC
- **Power consumption:** approx. 1.5 W
- **Dimensions:** approx. 120 X 90 X 30 mm
- **Weight:** approx. 100 g
- **Temperature range:** Operation: 0 – 50 °C, storage: -40 - 125 °C
- **Relative humidity:** 10 - 95 %, non-condensing
- **Protection type:** IP20
- **Galvanic isolation:** as an option CAN-bus to internal logics
  - 250 V AC for 1 min
- **Delay galv. isolation:** typ. 50 ns
- **CAN message buffer:** 100 messages per CAN segment
- **RS232 message buffer:** 100 bytes
- **PDO performance:** In the COPmode operation mode, the performance of the device is restricted to 500 PDO per second. This corresponds to a data flow of 19200 bit/s with full duplex or 38400 bit/s with half duplex
- **EMC test in accordance with:**
  - DIN EN 55022 / 05.1999
  - DIN EN 61000-4-2 / 03.1996
  - DIN EN 61000-4-3 / 06.1999
  - DIN EN 61000-4-4 / 03.1996
  - DIN EN 61000-4-5 / 09.1996
  - DIN EN 61000-4-6 / 04.1997
- **Cable supplied:** Laplink cable (for connection to a PC)

8.4 Sources of Data Sheets

**CAN-Controller SJA1000 and Transceiver 82C251**
http://www.philips-semiconductors.com
8.5 Conformity Declaration

This product is in compliance with the Electromagnetic Compatibility Directive. More information about the Declaration of Conformity can be found at www.ixxat.com.